Notice of Allowability	Application No.	Applicant(s)	
	10/079,559	MEHRVAR ET AL.	
	Examiner	Art Unit	
	Venkatesh Haliyur	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *02/16/2007*.

2. ☒ The allowed claim(s) is/are *1,3-9,11-18,20-23 and 25-28*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

The following is an examiner's statement of reasons for allowance:

1. The prior art of record fails to teach and render obvious the limitations as amended in claim 1,

A system for conveying an arbitrary mixture of high and low latency traffic streams across a common switch fabric, the system comprising:

at least two diverse paths mapped through the switch fabric from a common input interface to a common output interface, each path being optimized to satisfy respective different traffic latency requirements;

a latency classifier adapted to route each one of the traffic streams received at the input interface to one of the at least two diverse paths based upon a latency requirement of each traffic stream most closely matching the respective traffic latency of each of the at least two diverse paths;

at least two prioritization classifiers, each one of the prioritization classifiers associated with one of the at least two diverse paths, each prioritization classifier independently prioritizes traffic being conveyed through the respective path; and

wherein each one of the traffic streams received at the common input interface is routed to one of the at least two diverse paths by the latency classifier and each of the at least two diverse paths are processed independently by the respective prioritization classifiers before transport through the switch fabric to the common output interface.

2. In broadband packet network nodes the majority of packet processing normally occurs as each packet enters the node (referred to as ingress processing). Such ingress processing typically includes forwarding table look-up to selecting an appropriate output interface, and loading each packet into a queue for transport through a switch fabric to the selected output interface. A minimal amount of egress processing is typically performed (within the output interface) as each packet leaves the node. As is known in the art, traffic flows with differing latency requirements can be handled using a prioritization scheme as part of the ingress processing. The purpose of any prioritization scheme is to minimize delays experienced by high priority traffic being transported through the node. In general, prioritization schemes may be broadly classified as either preemptive, or non-preemptive. In a preemptive scheme, a high priority packet can preempt a lower priority packet already loaded into the queue for transport through the switch core. If transport of that low priority packet has already begun, then it is terminated so that the higher priority packet can be sent without delay. In contrast, in a non-preemptive scheme, if transport of a lower priority packet through the switch core has already begun, then it is allowed to continue uninterrupted. However, the higher priority packet must then be sent before the next lower priority packet is loaded into the queue. Both of these schemes have disadvantages. In particular, the pre-emptive scheme requires comparatively complex input processing and leads to an inefficient utilization of network resources. For example, preemption of a partially transmitted (lower priority) packet means that the "sent" portion of the packet is discarded. This results in lowered efficiency, as

network resources have been utilized to transport a partial packet that is subsequently discarded. Furthermore, in order to permit re-sending of the packet, it must be retained in memory (in the input interface) until it has been successfully transported through the switch fabric to the output interface. In addition, even when lower priority traffic is preempted, the additional processing required to implement this scheme imposes its own delays on the high priority traffic. As may be appreciated, the non-preemptive scheme avoids many of these difficulties, but at the expense of increasing latency of the high priority traffic, which is delayed until transmission of an already partially sent packet has completed. In practice, conventional prioritization schemes can result in the high priority traffic incurring a delay well in excess of 100 micro-seconds at the input interface. For most Internet Protocol (IP) traffic, such delays are acceptable. However, many traffic types have very stringent latency requirements. For example, under the Synchronous Optical Network (SONET) protocol, frame latency within a node (not just within the input interface) is restricted to a few tens of micro-seconds. Voice over IP (VoIP) and multimedia traffic are also latency-sensitive. While it would be desirable to transport a wide variety of traffic types across common network infrastructure, current prioritization schemes cannot reliably satisfy the stringent latency requirements of SONET traffic. Hence an object of the present invention is to provide a method and system for efficiently transporting traffic flows with differing latency requirements across a common network infrastructure where traffic streams within each path are processed independently. Each path may be mapped through respective different

physical infrastructure of the switch fabric. Alternatively, two or more paths are mapped through a common physical infrastructure, provided that it is capable of supporting a latency requirement of the path optimized to satisfy the most demanding latency requirements. A fairness classifier can be located at an egress of a path. This fairness classifier is designed to separate responsive and non-responsive traffic streams received through the respective path. In some embodiments, the fairness classifier is designed to route each of the responsive and non-responsive traffic streams to a respective buffer. In cases where each traffic stream being conveyed through the path contains Synchronous Optical Network (SONET) traffic (or, more generally, any mission-critical traffic), the prioritization classifier can be designed to route each traffic stream to a selected one of the buffers so that, for example, K-byte messaging is given priority over other traffic in the path. In cases where each traffic stream being conveyed through the path is an Internet Protocol (IP) traffic stream, the prioritization classifier can be designed to route each traffic stream to a selected one of the buffers based on a content of a Differentiated Services Code Point (DSCP) field of each packet overhead. Hence the present invention of the applicant(s) advantageously enables traffic flows with differing latency requirements to be efficiently transported across a common network infrastructure in a highly desirable QoS.

Patent Examiner

Venkatesh Haliyur

VH 4/20/07

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